Myths of the German atom bomb

Mark Walker

The persistent controversy surrounding the role of the German scientists in developing an atomic bomb during the Second World War can be laid to rest by the release of the Farm Hall transcripts.

WHY is the controversy surrounding the "German atomic bomb" — the efforts during the Second World War to harness the economic and military applications of nuclear fission — so persistent[1]? This controversy began at a time when little was known about what German scientists may have done in the service of National Socialism. Although we now have a thorough picture of nuclear fission under Hitler (see, for example, refs 2,3), many of the myths that plague this history have not been dispelled.

Most of the debate revolves around two brief episodes that have very little to do with the actual research on nuclear reactors and weapons: the visit paid by Werner Heisenberg and Carl Friedrich von Weizsäcker in 1941 to their Danish mentor Niels Bohr in occupied Copenhagen[4]; and the imprisonment of ten German scientists in a country house named Farm Hall in Godmanchester near Cambridge in the United Kingdom. Here I shall examine the second episode.

The main reason why the legends surrounding 'Hitler's bomb' cannot be dispelled is that they have always been used — at least in part — as a vehicle to debate a fundamental, but often repressed dilemma of contemporary science: should scientists work for their country or for their own professional advancement no matter what? Copenhagen and Farm Hall have been used and misused as proxies, red herrings and straw men in this debate.

The German atomic bomb

The question of whether German scientists tried to make atomic bombs has no one answer: if to try means investing the huge amounts of money, manpower and materials that were clearly necessary to develop and manufacture nuclear weapons, then neither German scientists nor anyone else in Germany 'tried'. But if to try means efforts to create and analyse substances known to be nuclear explosives as quickly as possible and in increasing amounts without harming the German war effort, then Germany, and these scientists, did try (see ref. 2).

The German work can be best put into perspective by comparing it to the joint US – UK effort. Up until the winter of 1941–42, the German work ran practically parallel to the Allied research. When the responsible science policy makers in the United States and Germany reviewed their respective nuclear-fission projects, both sides had comparable scientific results. But the context of the war was decisively different for both sides. In Germany, with a strained war economy and the recent failure of the *Blitzkrieg* in the (then) Soviet Union, it was commonly assumed that if Germany could not win the war quickly, it would lose. In the United States, with an untouched economy and vast resources, it was assumed that it would take four or five years to wear down Germany. Thus whereas Vannevar Bush and his colleagues in Washington decided that atomic bombs could influence the outcome of the war and therefore must be attempted, Erich Schumann and other officials at German Army Ordnance decided that nuclear weapons were irrelevant to the outcome of the war (page 49 of ref. 2). The effect of these different decisions was immediate. Although German scientists continued research into all applications of nuclear fission, including nuclear explosives, by the end of the war they had managed to match only what the Allies had accomplished by June 1942.

National Archives, Washington, DC.

Farm Hall — home to a myth?

But it was not so clear in the autumn of 1944 that the threat of German atomic bombs was merely a bad dream. The 'Alsos mission', a special scientific intelligence-gathering unit, followed closely on the heels of the advancing Allied armies and searched for any evidence of Nazi nuclear weapons. The scientific head of the mission, Samuel Goudsmit, had to decide whether documents and materials discovered should be seized or destroyed, and whether any scientists found should be arrested[5].

Goudsmit decided that ten scientists should be detained, including Erich Bagge, Kurt Diebner, Walther Gerlach, Otto Hahn, Paul Harteck, Werner Heisenberg, Horst Korsching, Max von Laue, Carl Friedrich von Weizsäcker and Karl Wirtz. His selections were sometimes arbitrary: several scientists who were released knew as much if not more than most of their colleagues at Farm Hall and others, like von Laue, were brought along merely because Goudsmit thought that they would make good spokesmen for German science.

What has made the situation of unusual interest is the fact that the UK authorities installed secret microphones for eavesdropping on their conversations. In 1962 Leslie Groves, the head of the Manhattan project, used excerpts from transcripts of these conversations to spice up his immodest memoirs, thereby revealing their existence[6]. Ever since, scientists and other interested parties have tried to force the release of these transcripts.

Why have these conversations been considered so important? Obviously because it was assumed on all sides that only by eavesdropping on what these scientists said in reaction to the news of Hiroshima could we learn the 'truth' about the German atomic bomb. But which truth has been sought? Groves' memoirs and his selective reproduction of excerpts from the Farm Hall transcripts have moulded the terms of the debate. His brief quotations suggest that Heisenberg did not understand the difference between an atomic bomb and a nuclear reactor, and that after the shock of Hiroshima, von Weizsäcker disingenuously created the story that the German scientists had not made nuclear weapons because they had not wished to.

Almost everyone interested in the mysterious Farm Hall transcripts has sought to find in them evidence for their side of the debate: either that Heisenberg was incompetent and von Weizsäcker therefore mendacious, or that Heisenberg knew how to make an atomic bomb and von Weizsäcker was just being honest. But this superficial concern with scientific competence has been part of a different, much deeper debate, the 'myth of the German atomic bomb'. One argument is that because of moral concerns, these German scientists consciously chose to control, slow down and divert their research to deny nuclear weapons to Hitler; the other view is that these scientists failed to achieve a nuclear weapon because of incompetence,

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but if they had succeeded, they would have handed these weapons to the Nazi leadership so that Germany could win the war (pages 184–186 of ref. 1).

Operation Epsilon

In November 1991, Nicholas Kurti, Rudolf Peierls and Margaret Gowing wrote a letter to the British Lord Chancellor, also signed by about 20 other distinguished scientists and historians, calling for the release of the Farm Hall recordings. A few months later, the Public Record Office in London released 212 pages of transcripts from 'Operation Epsilon', the code name for the eavesdropping. Shortly thereafter, the National Archives in Washington, DC also released their copy, which is much easier to read and includes a few dozen pages that are not in the British document.

What does Operation Epsilon tell us? There are no revelations or surprises concerning the German efforts to harness nuclear fission, but the conversations are interesting and historically significant in other ways. The scientists detained at Farm Hall were concerned with four questions: whether they were Nazis; whether they knew how to make atomic bombs; whether they wanted to make the bombs; and their future.

In answer to the first question, the two scientists who had been in the Nazi party were understandably defensive about their political past, and their colleagues were not always understanding. The transcripts show that several of them seemed concerned to rid themselves of any connection to National Socialism, prompting their jailors to wonder whether they had guilty consciences. But there was more to being a Nazi than party membership. According to the transcripts, the wardens at Farm Hall detected what they believed was the lingering effect of National Socialist ideology: with the possible exception of von Laue, the Germans apparently still believed in the master race.

The scientists expressed different opinions about the worst abuses by the Germans under National Socialism. Karl Wirtz was one of the few to state flatly that 'we' Germans had committed crimes. But when they learned of the detonation of the US atomic bomb at Hiroshima, this problem practically vanished. Other questions were now more important.

When Goudsmit asserted after the war that Heisenberg did not understand how an atomic bomb worked, there were three parts to this alleged lack of understanding. First, Heisenberg did not realize that plutonium was fissionable material suitable for a nuclear explosive; second, he did not realize that nuclear weapons used fast-neutron chain reactions; and third he did not understand that only relatively small amounts of fissionable material, not tons, were needed (page 204 of ref. 2).

There is ample evidence, available before the release of the Farm Hall recordings, that Heisenberg understood that uranium 235 and plutonium were fissionable materials suitable for nuclear explosives and that such nuclear explosives used fast-neutron chain reactions (page 56 of ref. 2). The transcripts corroborate Heisenberg's understanding and have cleared up the last remaining matter, that of critical mass.

According to the transcripts, Heisenberg reacted to the news of Hiroshima with great scepticism and indeed argued at first that the Allies could not have separated out the hundreds of tons of uranium 235 needed for a bomb. But his colleague Hahn immediately reminded him that during the war he had told him that only 50 kilograms were needed for a critical mass. After some prodding, Heisenberg admitted that, because it had appeared so unlikely that nuclear weapons could be produced during the war, he had not bothered to work out precisely how much fissionable material was needed.

Similarly, after newspaper accounts made clear that the Allies had also used plutonium in their atomic bombs, Heisenberg said that, because it had appeared so unlikely that they would be able to manufacture that element, they had not bothered to calculate fast-neutron reactions in plutonium. However, a few days later and having only their own research and the often misleading newspaper accounts to work with, Heisenberg presented a sophisticated and surprisingly accurate lecture on the Allied atomic bomb. So much for the theories that it was incompetence that had derailed the Nazi nuclear weapons project, or that the Germans had deliberately slowed down or diverted their research to deny atomic bombs to Hitler.

It is important to separate the question of whether the German scientists knew how to make atomic bombs from those of whether the Third Reich could have manufactured nuclear weapons before the end of the war, or of whether the scientists wanted to make atomic bombs for the National Socialists. The press reports of the attacks on Hiroshima and Nagasaki touched off a varied but pronounced reaction among the detainees. Several of them argued at first that they could not have made atomic bombs, not because of their own shortcomings, but because of the lack of vision, unwillingness, or the inability of the National Socialist leadership.

But the controversy surrounding the Farm Hall recordings has revolved around whether these scientists would in fact have made atomic bombs. The Operation Epsilon transcripts demonstrate that von Weizsäcker did indeed try to convince his colleagues that they had not wanted to make nuclear weapons, but rather than these arguments constituting a simple cover-up, as many have alleged, they were arguably more of a concerted attempt to persuade himself and his colleagues to revise their own memories to put a better face on an increasingly problematic past. His colleagues were not forced to agree with von Weizsäcker, although in time many did. However, the transcripts also make clear that von Weizsäcker's arguments most probably inspired the postwar myth of a conspiracy against Hitler. Von Weizsäcker argued that history would record that the Americans and British had made an atomic bomb, but that the Germans had produced a workable and peaceful nuclear reactor under the Hitler regime.

None of these questions was as important to the scientists as their professional future in the postwar environment they foresaw: tension if not war between the United States and the Soviet Union; and strict control of science in Germany in general and of nuclear-fission research in particular. Several of the detainees were apprehensive about how they would be treated when they returned home and were deeply mistrustful of the Soviet Union. These fears were balanced in part by a hope that the work they had done on uranium would make their collaboration an attractive prospect to the western powers.

The mood of the detainees brightened considerably once it was clear that their release was imminent. Indeed, Heisenberg practically dictated where he wanted to return to, the University of Göttingen, one of the few intact universities in the American or British zones. The British occupation authorities subsequently made great efforts to ensure that he and his colleagues were as comfortable as possible in postwar Germany.

The Farm Hall transcripts are an interesting historical source, but tell us nothing new about the German atomic bomb. But their release does mean that no one can pin their hopes on new revelations or secret knowledge. □

Mark Walker is in the Department of History, Union College, Schenectady, New York 12308–2365, USA.

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